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ENTOMOLOGICAL NEWS

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A Summary of the Sucking Lice (Anoplura).

By G. F. FERRIS, Stanford University, California.

(Continued from page 74)

For the reception of the 200 known species a total of 57 generic and subgeneric names has been proposed. Of these, one is invalidated by preoccupation and two by community of type with other Anopluran genera, thus leaving 54 names that are nomenclatorially valid. Of these—as an expression of purely personal opinion—the writer rejects 20, thus leaving 34 which in his view represents groups that are worthy of recognition in the present state of our knowledge. All of these rejected generic names are available for use, however, and some of them may possibly be employed by future workers.

The largest genera are *Hoplopleura* with 37 species, *Polyplax* with 28, *Linognathus* with 23 (another undescribed one is at hand), *Enderleinellus* with 19, *Neohaematopinus* with 17 and *Haematopinus* with 11. The number of monotypic genera—14—is rather large, but of these at least half will in all probability receive future additions. The others are probably genuinely monotypic, that is represent groups of which there remains but a single living species. Such are probably *Hybophthirus*, from the "aard vark"; *Haematopinoides*, from a North American mole; *Microphthirus*, from the American flying squirrels and *Lepidophthirus* from the southern sea elephant. The three species of *Microthoracius*, from Camelidae, almost certainly represent the entire complement of this genus and there can not be many more than the three known species of *Fahrenholzia*, from the little rodent family Heteromyidae. So with certain other genera; we may confidently assume that few, or even no, more species will be found.

The problems of distribution are among the most interesting of those associated with the group. Within certain limits it is evident that the distribution of the lice is correlated with the

phylogeny of the hosts. The genus *Polyplax*, for example, is characteristically present on rodents of the family Muridae; *Hoplopleura* ranges over several rodent families; *Enderleinellus* is strictly sciurid-infesting; *Linognathus*, with one curious exception, occurs only on Bovidae; *Pedicinus* belongs exclusively to the cynomorph monkeys. But there are a number of strange exceptions, some of which are susceptible to reasonable explanation, others of which are not.

How far the parallelism between the parasite and host groups extends and to what extent the classification of one group may legitimately be used to throw light on the phylogeny of the other can not finally be determined until the Anoplura are practically completely known and anything which may be said at the present time must be subject to reservations and future revision. For example. In the writer's opinion the lice of the lemuroids as far as known bear out Wood-Jones' contention that the lemurs are not Primates but are related to the tree shrews, but it must be confessed that our knowledge of the lice of the lemuroids is still too fragmentary to permit very definite decisions. It is entirely possible that further collecting will completely destroy the value of their evidence.

The lice of man and the monkeys present some of the most interesting and at the same time puzzling problems to be found in the study of the Order. The evidence is by no means all in, and probably will not be for many years to come, for to be satisfactory it must eventually include a considerable body of laborious and difficult experimentation together with cytological studies on chromosome numbers as well. But as it stands at present some things seem definitely indicated.

The lice of the cynomorph monkeys constitute in the writer's opinion but a single genus, *Pedicinus*, the other two genera which have been named being in his view uncalled for. This genus contains not more than 8 known species, for which some 15 names have been employed. The genus should be retained in the same family with *Pediculus*, but the two are well separated. This is consistent with mammalogists' views as to the relationships of the Cynomorpha.

One's attitude toward the problems within the genus *Pediculus* will be conditioned largely by his basic concept of the meaning of the word "species." As the writer has pointed out elsewhere, there are two different kinds of species. There are those groups of organisms which a systematist working from preserved material labels by the same name and there is a biological concept and the two may not coincide. This condition is well exemplified in this genus. In the writer's view most of the numerous "species" and "subspecies" which have been named in the genus *Pediculus* are purely "specimen species." For example, one so-called species, *P. lobatus* Fahrenholz, as originally described and as re-described by a later author, is based solely upon shrunken specimens, which when properly treated and expanded become another "species." Other species and subspecies have been described with a complete disregard of the possibilities of individual variation—it can not well be determined from a single specimen—and are of but little more significance.

The biological concept of the species, to which the writer has finally come, is this. "A species is a group of individuals forming a genetically linked or interwoven complex." With this definition in mind; with a background of the extensive experimental work on the lice of man which was carried out by Nuttall and his colleagues; and from the examination of a large range of material from different races of man and various species of monkeys and apes, this including various types and other authentic material, the writer has come to these general conclusions.

There are but three known, valid, biological species of the genus *Pediculus*, these being *P. humanus* Linnaeus, of man; *P. schäffi* Fahrenholz, of the chimpanzee; and a third, for which the name *P. mjöbergi* Ferris appears to be applicable, from New World monkeys. The supposed races, or subspecies of *P. humanus* from various races of man, have no existence in fact, with the possible exception of a form which may be characteristic of African negroes.

It is evident that the distribution of the species of *Pediculus*,

as our knowledge stands at the moment, presents some strange aspects. The occurrence of one of these species upon New World monkeys, which are conceded by all mammalogists to be but remotely related to any of the other Primates is unreasonable from any point of view. But this is merely one of several such problems which may eventually be elucidated when our knowledge has been properly extended.

As to the ecology of the sucking lice, we at present know but very little. The work which has been done upon *Pediculus humanus* includes practically all that has been done. Here are still fields that are virtually unexplored.

The Copperhead as a Destroyer of Cicadas.

It is generally known that the copperhead, *Agkistrodon mokasen* Beauvois, ordinarily subsists upon a diet of frogs, mice, and other small mammals, varied by an occasional bird: consequently, when one of these snakes forsakes the realm of vertebrata for food, the event is worthy of note.

Examination of the stomach contents of an example of this species, collected at Bloomsdale, Missouri, on August 9, 1931, disclosed a large cicada (identified as *Tibicen chloromera* Wlk. by Mr. William T. Davis) in a partly digested state. Of course it frequently happens that insects found in snake stomachs had been eaten previously by vertebrate victims of the snakes rather than by the snakes themselves. In such cases the bones of the vertebrates are usually present with the insect remains, but in the present instance no other animal matter was found, so it is probable that the snake actually seized the cicada for food.

This observation agrees with those of Surface,* who examined the contents of the stomachs of more than forty copperheads and found cicadas (*Magicicada septendecim* Linn.) in six of them.

All six had gorged themselves upon these insects, which constituted eight per cent of the total amount of food consumed by the snakes he examined. This snake appears, therefore, to be a regular destroyer of cicadas, although it still remains to be determined whether copperheads habitually seek them for food or feed upon them only when there is a lack of sufficient vertebrate prey.—Dorothy A. Boyer and Albert A. Heinze, Kimmswick, Missouri.

* Surface, H. A. Zool. Bull. Penna. Dept. Agr., Vol. IV, p. 189, 1906, and Vol. V, p. 74, 1907.

New Species of Buprestidae (Coleoptera) with Notes Concerning Others.

By Edwin C. Van Dyke, University of California, Berkeley, California.

(Continued from page 66)

Chrysobothris boharti new species.

Moderately elongate, more or less depressed, bright green or bronze green above, dark bottle green beneath, shining, the head and undersurface finely sparsely pilose, the elytra also showing a few fine and sparse hairs apically.

Head moderately convex, rather coarsely, closely punctured, interstitial areas alutaceous, occiput with a fine, median longitudinal line, often extending forwards even as far as the clypeus and sometimes impressed, especially in females and posteriorly, the front sometimes with vague callosities and often oblique lines above as well; clypeus broadly, shallowly emarginate, with sides of emargination a bit angulate; the eyes large and well separated; antennae piceous or more or less greenish towards base, gradually more slender to tip, third segment elongate but not quite as long as the two succeeding segments together, the fourth and following segments transverse.

Thorax about twice as wide as long, sides somewhat parallel at middle and obliquely convergent towards base and apex, dorsum convex, deplanate laterally, rather coarsely, closely punctured especially at sides, generally with transverse strigosities, without well defined median sulcus or callosities, though often with a fine median smooth line extending from base to center which is in turn a bit impressed in a few individuals, the interstitial areas also alutaceous as in the case of head and elytra.

Elytra but little wider than prothorax, sides slightly sinuate, broadest back of middle, obliquely narrowed towards apex, each elytron individually rounded at apex, and without well defined serrations though with vague indications of same under high magnification, the disk rather closely, distinctly punctured on basal area, more finely apically, basal impressions distinct, the median and posterior evident though vague, and several of the costae more or less defined.

Body beneath coarsely, closely punctured on prosternum, coarsely, shallowly punctured on pleurae, the abdomen more finely, sparsely punctured and shining and without evident serrations on lateral margins, the apex of last ventral segment more coarsely and closely punctured than in front, and the prosternum definitely lobed in front. Length 8-10 mm., width 3.75-4.5 mm.

♂. Generally smaller and less robust, with prosternum more densely punctured and clothed with rather long pile, the last ventral segment rather deeply, semi-circularly emarginate at apex, and the anterior tibiae arcuate and with an elongate dilation at apex.

♀. With prosternum less closely punctured at middle and more finely, sparsely pubescent, the last ventral either finely notched or but faintly emarginate at apex, and with anterior tibiae feebly arcuate and without dilatation at apex.

Holotype male, *allotype* female (Nos. 3758 and 3759 Mus. Calif. Acad. Sci.), and five *paratypes*, all collected by Mr. R. M. Bohart at an altitude of 1100 feet on Mt. Hoffman, Yosemite National Park, CALIFORNIA, July 30, 1933. The holotype, allotype and two paratypes will be deposited in the collection of the California Academy of Sciences through the generosity of Mr. Bohart, the other specimens remaining in his possession.

This interesting species does not strictly fall into any of the groups given by Horn.[3] Its non-serrate last ventral and vague elytral foveae and costae would place it in Group VIII near *prasina* Horn but it lacks distinct elytral serrulations. It is also somewhat related to *cyanella* Horn of Group V as shown by the dilated apices of the anterior tibiae in the male and slightly pubescent elytra. Its most conspicuous feature is the practically smooth elytral margin.

DICERCA TENEBRICA Kirby.

Dicera prolongata Lec. will have to be placed as a synonym of the above. Though Kirby's type seems to be lost, there is a specimen from the Saunder's collection in the British Museum which is marked "Compared with type of *tenebrica* Kirby." This also agrees with LeConte's *prolongata*. Crotch[4] called attention to the fact that the description of *tenebrica* fitted *prolongata*. The locality where the former was collected is also the region where the latter is normally found, not where *divaricata* (Say) is most common.

[3] A monograph of the species of *Chrysobothris* inhabiting the United States, by Geo. H. Horn, Trans. Am. Ent. Soc., Mch. 1886, p. 71.
[4] Proceed. Nat. Sci. Phila., vol. XXV (1873), pp. 84-85.

DICERCA SEXUALIS Cr. and DICERCA CALIFORNICA Cr.

I consider that these two are the same species, the first name unfortunately having priority. They have the same range and only differ as regards the apices of the last ventral segment in the females. I have found the same differences among individual females of the more common *tenebrosa* Kirby, so consider the character of no specific value.

DICERCA MUTICA Lec.

The only known specimen of this is the type in the LeConte Collection at Cambridge. To me, after having studied it critically at least three different times, it appears to be nothing more than an unnatural or deformed specimen of *Dicerca obscura* (Fab.). It is definitely asymmetrical, the prothorax in particular more dilated on the right side, the left similar to that in typical *obscura*. The elytral apices which have the outer spine eliminated might easily have this as a result of the general deformity. If it were a good species, it seems hardly possible that a second specimen should not have been collected since the first was taken over seventy years ago.

Notes on the Behavior of Creophilus villosus Grav. (Coleoptera: Staphylinidae).

By CYRIL E. ABBOTT, Morgan Park, Illinois.

The generally accepted conclusion that *Creophilus villosus* is necrophagous (see Comstock, J. H., Introduction to Entomology, p. 489) has been drawn from the fact that the species occurs in great numbers on animal carcasses. But the obvious preference of the beetle for living blowfly larvae, raises several interesting questions. Is *Creophilus* drawn to carrion through an olfactory sense? Are the antennae, or palpi, or both, olfactory in function? How does *Creophilus* recognize the edibility of fly maggots?

Adult beetles were kept in a cylindrical cardboard box about seven inches in diameter. It was half filled with sand and covered over with a double thickness of cloth. Experiments were conducted in a glass fruit jar of quart capacity. While

unmolested, most of the beetles, excepting for short intervals of exploration, lay buried in the sand. Sometimes, especially at night, they attempted to escape by gnawing through the cloth covering.

After a period of about thirty hours, during which the insects had received no food, and while all were buried, I placed on the surface of the soil a piece of freshly cooked beef about the size of a walnut. In a few minutes several of the beetles had left their burrows to gnaw at the meat. About this time the discovery of the predilection of the beetles for maggots prompted further experiments.

About fifty living maggots, after being carefully washed, were placed in a cloth sack suspended about one-fourth inch above the sand. The six beetles used in this test had the antennae amputated close to the head. Nothing unusual was noted until the morning of the fourth day from the beginning of the test, at which time the remains of several maggots were found, and an opening about one-fourth inch in diameter was found in the sack.

This experiment was repeated with the following modifications: the maggots were dead and the *Creophili* lacked both the antennae and palpi. After three days the maggots were still untouched. However, when this test was repeated under identical conditions but with a different group of beetles, not only was a hole made in the sack, but one beetle was actually seen devouring a maggot.

Maggots, living and dead, were fed to individual beetles variously treated. Four normal beetles made attempts to seize maggots 1 cm. distant. Beetles without antennae and palpi, as well as those without antennae, made no attempt to take the maggots until the latter were in actual contact with their heads.

Small sections of match stick, about the size and color of individual maggots, were attached to a thread and dragged over the sand not far from the beetles. At a distance of more than 2 cm. *Creophilus* appeared not to notice these bits of wood. More often the stick was seized at a distance of 1 cm.

or less. Of course, when once seized, the stick was quickly rejected.

Mutilated specimens of *Creophilus* appeared to live as long as normal specimens, and since they copulated quite freely, their behavior could hardly be considered abnormal.

In spite of their crudity, the experiments detailed above do seem to indicate that *Creophilus villosus* is by preference predaceous upon fly maggots and possibly other small insects. The mandibles of this species are sickle-shaped, and hence admirably fitted for seizing prey, while this very structure makes the chewing of heavy, muscular tissue difficult, as any one who has observed the attempts of *Creophilus* to eat beef will realize. On the other hand, it is fairly obvious that this species is attracted to the place where it feeds by the odor of decaying flesh. Indeed odor must be the chief guide to the prey itself. The beetles see badly. Although large objects in motion (such as the movements of the experimenter) may send the beetles running wildly about, small objects are scarcely noticed. Vision cannot function very well beneath a carcass. No doubt *Creophilus* is guided to some extent by contact.

Judging from the behavior of mutilated specimens, the antennae and palpi of *Creophilus* may be the seat of an olfactory sense. That the sense is not restricted to those organs is indicated by the fact that mutilated specimens still reacted to maggots, and even to decaying flesh.

An Abnormal Butterfly Collected in the Field. (Lepid.: Pieridae).

On the 27th of July, 1933, a male *Pieris protodice* Boisduval and Leconte was captured in the sweeping net near Glen Lake, Hennepin County, Minnesota. The right eye was white, the left red. The left antenna was missing. Careful removal of the scales about the antennal region failed to reveal any antennal stump or any sign that an antenna had been present on the left side. The butterfly died shortly after capture. Dissection showed normal male genitalia. The white eye appeared to have a complete complement of ommatidia and was merely lacking in pigmentation.—NELLIE M. PAYNE, University of Minnesota.

A Simple Valve for Controlling Liquid Flow under Hydrostatic Pressure, through Rubber Tubing.*

By S. W. SIMMONS, Washington, D. C.

The principle of using a glass bead in rubber tubing to check or regulate liquid flow, although occasionally employed in laboratories, apparently is not widely known. It is desired here to call attention to this simple device.

The convenience of a valve that controls the rate of flow, and instantly stops it when shut off, is evident to most users of ordinary pinch-cocks. In making such a valve a solid, round, glass bead is inserted into the tubing, (Fig. 1A). The bead should be slightly larger than the inside diameter of the tube

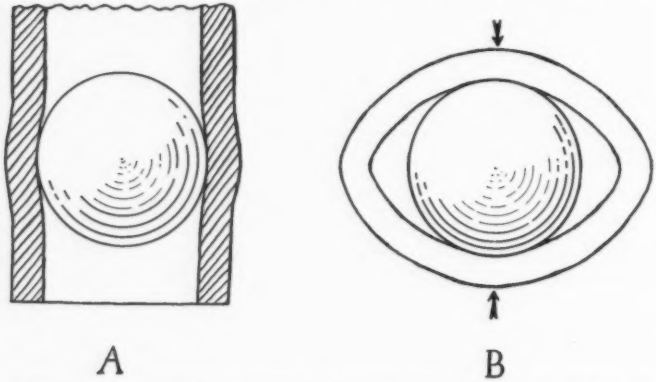

Fig. 1. A. Longitudinal section of closed valve. B. Cross section of closed valve, showing openings made by applying pressure at arrow points.

in order to hold it in place and prevent leakage. By pressing the tube between the fingers, at the point of the bead, a bulge is caused on each side of the obstruction (Fig. 1B), permitting liquid to pass. The rate of flow is proportional to the pressure applied. It may be varied from a mere drop to a steady stream.

* From the Division of Insects Affecting Man and Animals, U. S. Bureau of Entomology.

With certain pinch-cocks it is difficult, and often impossible, to obtain a slow stream of liquid, and to check it immediately; and when rapidly transferring the tube from one container to another, as in tubing culture media, this excess liquid usually drops on the table or on the sides of the culture tube. Rarely does a drop pass out after pressure is released from the bead valve. After releasing most pinch-cocks it is necessary to hold them in the correct position for reclamping. With the bead this is rendered unnecessary, as the tube holds it firmly in place preventing any dislocation. Tubing clamped for a time by a pinch-cock becomes permanently flattened, thus obstructing liquid flow. A bead valve does not press the tube out of its normal shape.

The valve is not suitable where a large forceful stream is desired, as when filling large containers from a reservoir. Five hundred cc. of water is delivered from a funnel through an unobstructed 16-inch tube, 4 mm. inside diameter, at the average rate of 25 cc. per second, whereas the bead valve allows a maximum flow of about 5 cc. per second, under the same conditions. The latter amount may be varied to quantities approaching zero.

The bead valve is especially recommended for work requiring quantities of liquid which must be controlled, as in filling small vials with alcohol, etc., tubing culture media, capping anaerobic media with hot oils, and rinsing stains from bacteriological slides. It will be found very useful on the end of burettes when doing titration or other work requiring precise measurements. Thin-walled tubing should be employed with this type of valve, as it is tiresome to maintain extended pressure on heavy tubing.

Summary of advantages of the bead valve: (1) Convenient, (2) simple, (3) inexpensive, (4) does not dislocate by slipping, (5) stops liquid flow instantly when pressure is released, (6) does not pinch tubing out of shape, (7) permits an accurate control of the rate of liquid flow.

Studies of Semidesert Ants (Hymenoptera: Formicidae).

By A. C. Cole, Jr., Twin Falls, Idaho.

1. Seasonal Successions of Ants in a Typical Portion of the Sagebrush Semidesert.

In spite of the popular opinion of the stability of an ant colony contain factors operating on the individuals tend to make the colony an unstable unit. Thus, as seasonal successions occur among non-social animals and plants, they may appear also in the case of colonies of ants—typical social units, each individual of which is an integral part of its colony.

As is well known, a group of factors, rather than a single one, brings about succession, although at times one or more of these dominates. Breaking up the group, we may say that in this particular case the apparent dominants are moisture and temperature, and these together produce and modify other factors. Composition of soil is important in ant successions only when considered from the standpoint of moisture, temperature, and the existing vegetation.

During early spring a great many ant colonies inhabit superficial nests on hill slopes, chiefly those facing the south. At such locations atmospheric and soil temperatures are higher than at others. The moisture content of the soil remains relatively high in spite of the higher temperatures and stronger winds on the slopes. The soils of the more level areas and, in many places, those of the north-facing slopes, are almost too moist for ant colonization and activity. Most of the ants moved from these locations during the previous fall to places with more favorable moisture and temperature conditions. As the spring season progresses precipitation decreases and temperatures reach and fluctuate at higher levels. The soil dries and its temperature at various levels is and remains much higher than earlier in the season. Meanwhile, the soil on the south-facing slopes has become practically air-dry as the result of high mean temperatures and rapid evaporation of moisture, and the annual vegetation becomes scant and dry. It is de-

cidedly a poor habitat for most ants, and except in protected areas, such as along rock ledges, where the temperature of the soil is lower and the moisture content higher, or along a stream where sufficient moisture continually prevails in the soil, the area is limited to a few species characteristic of a xeric habitat. The species which prevailed on the south-facing slopes during the spring later migrate to north-facing slopes with more favorable conditions, and there they may be found throughout the summer. As late autumn appears, many of the ants again migrate, this time from the north-facing to the south-facing slopes because of decreasing temperatures of the summer habitat.

An area 1/10 mile square was selected on a typical south-facing slope in the semi-desert region near Twin Falls, Idaho, in which to study seasonal ant successions. The results of this study appear in Table 1. During spring and autumn there was a total of fifteen species, subspecies and varieties present, while during the summer only twelve, and during the winter fourteen. This summer minimum was caused apparently by the hot, dry condition of the hillslope. Among the species tending to shift habitats in response to changes in climate were *Lasius niger americanus* Emery, *Lasius niger sitkaënsis* Pergande, *Tapinoma sessile* Say, *Leptothorax curvispinosus rugatulus* Emery, *Lasius umbratus mixtus aphidicola* Walsh, and *Formica fusca subaenescens* Emery. It will be noted by consulting the table that the number of nests of moisture-loving species noticeably declined during the summer and in most cases normally increased in autumn and winter. The number of nests of mound-building species, however, as well as those of *F. subpolita* and *F. subpolita camponotoceps*, remained constant throughout the year.

Many species, particularly the mound-building ones, spend their entire existence in one habitat. Examples of these are *Formica rufa obscuripes* Forel, and *Pogonomyrmex occidentalis* Cresson, which because of adequate nest construction are well able to withstand marked fluctuations in climate.

TABLE 1.

Seasonal Successions of Ants on a South-facing Hillside Near Twin Falls, Idaho.

Spring	No. of Colonies	Summer	No. of Colonies	Autumn	No. of Colonies	Winter	No. of Colonies
Formica subpolita Mayr	32	Formica subpolita Mayr	32	Formica subpolita	32	Formica subpolita Mayr	32
F. subpolita camponoticeps Whlr.	12	F. subpolita camponoticeps Whlr.	12	F. subpolita camponoticeps Whlr.	12	F. subpolita camponoticeps Whlr.	12
F. fusca subaenescens Emery	16	F. fusca subaenescens Emery	2	F. fusca subaenescens Emery	4	F. fusca subaenescens Emery	10
F. fusca gelida Whlr.	3	F. fusca gelida Whlr.	3	F. fusca gelida Whlr.	3	F. fusca gelida Whlr.	4
F. rufa obscuripes Forel**	8	F. rufa obscuripes Forel**	8	F. rufa obscuripes Forel**	8	F. rufa obscuripes Forel**	8
Polyergus breviceps Mayr	1	Polyergus breviceps Mayr	0	Polyergus breviceps Mayr	1	Polyergus breviceps Mayr	1
Lasius niger americanus Emery*	16	Lasius niger americanus Emery*	7	Lasius niger americanus Emery*	12	Lasius niger americanus Emery*	13
L. niger sitkaënsis Pergande*	2	L. niger sitkaënsis Pergande*	0	L. niger sitkaënsis Pergande*	3	L. niger sitkaënsis Pergande*	0
L. umbratus mixtus aphidicola Walsh*	5	L. umbratus mixtus aphidicola Walsh*	1	L. umbratus mixtus aphidicola Walsh*	4	L. umbratus mixtus aphidicola Walsh*	7
Tapinoma sessile Say*	6	Tapinoma sessile Say*	1	Tapinoma sessile Say*	7	Tapinoma sessile Say*	9
Pogonomyrmex occidentalis Cresson**	6	Pogonomyrmex occidentalis Cresson**	6	Pogonomyrmex occidentalis Cresson**	6	Pogonomyrmex occidentalis Cresson**	6
Leptothorax rugatulus Emery*	7	Leptothorax rugatulus Emery*	6	Leptothorax rugatulus Emery*	4	Leptothorax rugatulus Emery*	6
Monomorium minimum Buckley*	3	Monomorium minimum Buckley*	1	Monomorium minimum Buckley*	2	Monomorium minimum Buckley*	1
Solenopsis molesta Say*	21	Solenopsis molesta Say*	8	Solenopsis molesta Say*	17	Solenopsis molesta Say*	23
Aphaenogaster uinta Whlr.*	7	Aphaenogaster uinta Whlr.*	0	Aphaenogaster uinta Whlr.*	6	Aphaenogaster uinta Whlr.*	9
Total	145	Total	86	Total	121	Total	141

* Moisture-loving species.

** Species with stationary nests (mounds).

2. Ant Communities of a Sand Dune Area in Southern Idaho with Special Reference to the Dominant Vegetation.

Description of the Area. Many large active dunes of pure sand are to be found in a semidesert area about fifteen miles south and west of Hammett, Idaho. The dune area is composed of several diverse units. On the eastern margin is an extensive level plain of mixed vegetation consisting chiefly of *Atriplex canescens, Atriplex confertifolia, Artemisia tridentata, Chrysothamnus graveolens, Chrysothamnus* sp., *Sarcobatus vermiculatus,* and *Bromus tectorum.* West of this plain are small rolling hills of sand covered with shrubs. These may be spoken of as small stable dunes. They are covered with clumps of *Artemisia tridentata, Chrysothamnus graveolens, Sarcobatus vermiculatus,* and *Atriplex confertifolia.* Still farther west are long, low dunes of sand in an active condition. These support plants of *Psoralea* sp. whose long twining root-stalks are constantly being exposed on the surface. The next unit of the area is a shallow valley of sand in which grow many plants of *Oryzopsis hymenoides Franseria* sp., and *Eriogonum* sp.* This community is more or less protected from the force of the wind by the low narrow dunes on the east and the large dunes on the west which form the next part of the area. These large dunes are constantly being shifted by the wind and support no vegetation of any nature. Just beyond the large dunes is a deep valley in which grows abundant vegetation, consisting of *Chrysothamnus graveolens, Artemisia tridentata, Sarcobatus vermiculatus, Atriplex canescens, Hilaria* sp., and *Salix* sp. Most of the plants of this community grow in clumps with large areas of intervening bare sand. West of this valley are many small dunes which merge into another plain of mixed vegetation.

The Plant Communities. The plant communities may be divided into, (1) the Sagebrush-Mixed Community, (2) the Shrub-Hill Community, (3) the Psoralea Community, (4) the

* The plants were determined by R. L. Piemeisel, U. S. Bureau of Plant Industry, Twin Falls, Idaho.

Oryzopsis-Franseria Community, and (5) the Shrub-Perennial Grass Community. Between the Oryzopsis-Franseria and Shrub-Perennial Grass Communities is a barrier of large active dunes. The composition of these communities has been discussed in a foregoing paragraph.

The Ant Communities. Three communities of ants were evident; namely, (1) the Pogonomyrmex-Formica Community, (2) the Myrmecocystus Community, and (3) the Pogonomyrmex-Myrmecocystus Community. There was a gradual overlapping of all three.

The Pogonomyrmex-Formica Community occupied the level semi-desert plain which contained the Sagebrush-Mixed Plant Community. Predominant were incipient and fully-developed mounds of the Occident Ant (*Pogonomyrmex occidentalis* Cresson). These mounds were scattered in the Bromegrass (*Bromus tectorum*) areas between the shrubby vegetation. Under rocks in the bare areas were many colonies of *Formica subpolita* Mayr., and a few nests each of *Lasius niger americanus* Emery, L. *niger sitkaënsis* Pergande, and *Tapinoma sessile* Say. There were also a great many incipient mounds containing only queens of *Myrmecocystus mexicanus* subsp. or var.

The Myrmecocystus Community was found to occupy the Shrub-Hill Plant Community on the small stable dunes. Its dominant was *Myrmecocystus melliger semirufus* Emery and the small, exquisitely sculptured crater nests abounded in the bare sandy areas between the shrubs. This appears to be the northernmost record of *M. semirufus* which is quite common in the deserts of Arizona, New Mexico, and California. Winged males and females, as well as large numbers of workers were present in all of the nests. Associated with *M. melliger semirufus* were many colonies of *M. mexicanus* subsp. or var., a large semitransparent, lemon-yellow ant. Winged forms of both sexes were present and workers abundant in nests of this variety.

The Myrmecocystus Community merged into the Pogono-

myrmex-Myrmecocystus Community in the area occupied by the Shrub-Perennial Grass Plant Community. No ants were found on the intervening dunes or in the shallow valley supporting the Oryzopsis-Franseria Plant Community. Components of this ant community were *Pogonomyrmex occidentalis* and *Myrmecocystus melliger* subsp. or var. Neither species occurred abundantly but there were more nests of *P. occidentalis* than of the latter. The mounds of both species were small and scattered and contained relatively few individuals.

The Biotic Communities. Combining the plant and ant communities we may express them as follows: (1) the Sagebrush-Mixed—Pogonomyrmex-Formica Community, (2) the Shrub Hill—Myrmecocystus Community, (3) the Psoralea—Ant Free Community, (4) the Oryzopsis-Franseria—Ant Free Community, and (5) the Shrub-Perennial Grass—Pogonomyrmex-Myrmecocystus Community.

The above classification enables one to secure a clear picture of the component units of a typical sand dune area in the semidesert region of the western United States.

(To be continued)

Vespula germanica Attacks a Living Eacles imperialis (Hymen.: Vespidae; Lepid.: Citheroniidae).

The great variety of food taken to the nest by *Vespula germanica* Fabr. is well known, and it should not be surprising to observe these wasps attacking live adult insects. The Raus (Wasp Studies Afield, 1918, pp. 295-296) list the following kinds of animal food which they saw used by wasps of this species: greasy chicken bones, eyes of dead rat, dead roach, cold broth, and head of rooster, and in ENTOMOLOGICAL NEWS, June, 1930 (xli: 185-190), Rau gives records of their attacks on a moth and a grasshopper. The following instance of similar behavior adds another definite record to our knowledge of their feeding habits; it is interesting because of the disproportionately small size of the wasp as compared to that of its prey.

Late in the afternoon of August 3, 1933, at Ranken, St. Louis County, Missouri, I saw a battered female *Eacles imperialis* Drury lying on the ground beneath a shrub, its wings quivering

as though flight were imminent. While I was hurriedly preparing to take the moth alive for the purpose of securing eggs, a little yellow-jacket, *Vespula germanica*, emerged from the moth's abdomen. Closer inspection revealed a hole on the lower surface of one of the abdominal segments, just large enough to permit the passage of the wasp. I placed the moth on the ground again and awaited the wasp's return. I watched while the wasp made one trip after another; the moth would flutter feebly while the wasp was working inside of its body, but remained quiet while it was away. The nearly uniform length of the wasp's absences and the fact that there was never more than one wasp present at a time made it certain that this one was always the same individual, and that it did not lead others to the place as bees do under similar circumstances. On each trip, after working for several minutes inside the moth's body, the wasp would fly to a branch of the shrub overhead where it would cling while adjusting its burden, which could be seen as a yellow mass larger than the wasp's head. Then a short, circling flight of orientation would be followed by a swift flight away toward the northeast. Attempts to find the nest by following the wasp were unsuccessful. At the conclusion of the observations, after about a dozen flights, the moth was quite dead; most of the abdomen had been cut away by the wasp and carried to the nest, and a large cavity had been dug from the abdomen into the interior of the thorax.—HAROLD O'BYRNE, Webster Groves, Missouri.

Cresson's Synopsis of the Hymenoptera.

It was rather startling to find in Dr. Clarence E. Mickel's article "Contribution to Taxonomy of Insects" Ann. Ent. Soc. Amer., XXIII, pp. 507-512, (1930) complete omission of reference to one of the best known works on the taxonomy of the Hymenoptera, the "Synopsis of the Families and Genera of the Hymenoptera of America North of Mexico, together with a Catalogue of the Described Species and Bibliography," by E. T. Cresson, 1887. This contribution of 350 pages is the only work of this kind on the North American fauna. It has never been revised or brought up to date, and consequently is consulted by all hymenopterists having access to this scarce publication. No doubt Dr. Mickel, who is making a special study of the hymenopterous family Mutillidae, had a copy on his desk while writing this article and, being so near him, it was overlooked.

Notes on Orthoptera from Northwestern Minnesota.

By Morgan Hebard.

During the summer of 1933 a large series of Orthoptera was secured at Plummer, in northwestern Minnesota, by D. Denning. As we have recently reported on the Orthoptera of Minnesota [1] and as several interesting extensions of distribution are included in this material, the following brief notes are here presented.

Plummer is located near the western edge of the narrow belt of deciduous forest, between the prairie and coniferous-deciduous forests. This forest there consists of oak, poplar, elm, cottonwood and a few ash. The elevation is between 1000 and 1500 feet. Collecting was largely confined to an area along the Clearwater River and the adjacent fields and swamps.

Acrydium granulatum Kirby. Large series were secured.

Acrydium acadicum acadicum (Scudder). 3 ♂, 8 ♀. The majority were taken in late May and early June.

Acrydium ornatum (Say.) 4 ♂, 14 ♀ (six females caudate, one male and one female subcaudate, the others abbreviate) were captured from July 1 to October 4. In this series the one or two largest specimens are, as is often the case, extremely difficult to distinguish from *acadicum acadicum*. More difficulty in the Plummer series, lies in the fact that considerable individual variation in the large series of *arenosum angustum* is shown and a number of specimens of that insect could easily be mistaken for *acadicum acadicum* or *ornatum*. Plummer is a northern limital point in this longitude.

Acrydium arenosum angustum (Hancock). 50 ♂ and 70 ♀ were secured from May 29 to September 17 and a large series of immature individuals was also taken. A goodly percentage of the adults were subcaudate. Two males and five females have a pale pronotal saddle and one female has the dorsum of the pronotum light red brown with latero-cephalic portions alone dark. Plummer is a northern limital point in the distribution of this race.

Tettigidea lateralis lateralis (Say). 15 ♂ and 23 ♀, taken May 27 to August 22 and 13 immature individuals were secured. The adults are very depauperate. Two females are

[1] Minnesota Tech. Bull. 85, pp. 1 to 61(1932). Note that the collections made in 1932 are separately recorded on pages 54 to 61.

caudate, the other adults abbreviate. The series is graceful in form, the average more slender than in southwestern series but not quite as slender as the majority from the southeast. This bears out strongly our recent decision that *lateralis parvipennis* (Harris) may not be worthy of racial recognition, but if recognizable is certainly not a race which occupies all of the northern portions of the distribution of the species, as we had for some time supposed. Plummer is a northwestern limital point for the insect.

ORPHULELLA SPECIOSA Scudder. A large series was taken. Plummer is a northern limital point.

ORPHULELLA PELIDNA (Burmeister). 4 ♂ and 13 ♀ were taken at Plummer, which is a very slight extension northward of the known range of the species.

CHLOEALTIS CONSPERSA Harris. 12 ♂ and 7 ♀. One male and one female are macropterous. In the many hundreds of specimens of this species which we have seen, there is only one other macropterous male, from Duluth, Minnesota. Macropterism in females is infrequent but by no means as rare as in males.

CHORTHIPPUS CURTIPENNIS (Harris). A very large series was taken including occasional macropterous individuals.

STETHOPHYMA GRACILE (Scudder). 5 ♂ and 4 ♀ were taken June 16 to September 24.

STETHOPHYMA LINEATUM (Scudder). 2 ♂ were secured July 29 and August 23.

AGENEOTETTIX DEORUM (Scudder). Only three females were secured at Plummer. Though this a northern limital point the species undoubtedly occurs over all of extreme western Minnesota.

ARPHIA PSEUDONIETANA (Thomas). 8 ♂ and 9 ♀ show decided size variation, two being extremely small.

CHORTOPHAGA VIRIDIFASCIATA (DeGeer). The majority of 17 ♂ and 12 ♀ were taken in late May, but a battered individual was secured as late as August 15.

ENCOPTOLOPHUS SORDIDUS COSTALIS (Scudder). Recent additions to our series have convinced us that two species can not be recognized and that *costalis* must be considered the western race of *sordidus*. A large series was captured, all of the specimens being typical of *sordidus costalis*. A goodly number of the specimens are partly or largely green.

CAMNULA PELLUCIDA (Scudder). Among the thirty specimens a number are very pallid.

PARDALOPHORA APICULATA (Harris). 2 ♂ were secured May 27 and June 1.

DISSOSTEIRA CAROLINA (Linnaeus). Five specimens were taken.

SPHARAGEMON BOLLI Scudder. 6 ♂ and 7 ♀ were taken July 18 to August 18 at Plummer, which is a western limital point in the known range of the species.

SPHARAGEMON COLLARE (Scudder). 17 ♂ and 18 ♀ show unusually great variation in size and coloration.

TRACHYRHACHIS KIOWA KIOWA (Thomas). 26 ♂ and 30 ♀ are typical of this Great Plains race.

HESPEROTETTIX VIRIDIS PRATENSIS Scudder. 2 ♂ and 2 ♀ were secured at Plummer on August 12 and 14, that locality being a northern limit. These specimens are typical of *viridis pratensis*.

MELANOPLUS BIVITTATUS (Say). The caudal tibiae in the 8 ♂ and 7 ♀ are pink in one male and two females, pink distad in one female, greenish yellow becoming yellow distad in two males and one female and bluish black paling to glaucous or yellowish distad in the others.

MELANOPLUS DAWSONI (Scudder). In the series of 11 ♂ and 12 ♀ there are seven females and four males which are macropterous. This is a very high percentage for that condition in the present species.

MELANOPLUS GLADSTONI (Scudder). 2 ♂ and 5 ♀ taken August 18 to September 4 are very small for the species, two females being the smallest we have seen.

MELANOPLUS FEMUR-RUBRUM FEMUR-RUBRUM (DeGeer). Nineteen specimens were taken.

MELANOPLUS INFANTILIS Scudder. 10 ♂ and 5 ♀ were secured at Plummer from August 8 to September 4. This is a northeastern limital record for the species.

MELANOPLUS FASCIATUS (F. Walker). 7 ♂ and 2 ♀ were taken from July 17 to 21.

MELANOPLUS BOREALIS BOREALIS (Fieber). A female taken at Plummer on June 21 is perfectly typical of *borealis borealis*.[1] This constitutes a southern limital point for this northern race, though some specimens from northern Minnesota which we re-

[1] It agrees fully with material from Birch River and Aweme, Manitoba, now before us. The species is exceedingly plastic and the southern race *junius* may prove to be no more than a pallid color phase in response to a more temperate environment. Detailed study of many series can alone determine how many races of *borealis* should be recognized.

ferred to *borealis junius* we believe should also be assigned to the present race.

MELANOPLUS MEXICANUS MEXICANUS (Saussure). Six specimens were taken.

MELANOPLUS BRUNERI Scudder. 3 ♂ and 10 ♀ were captured from July 21 to September 17.

MELANOPLUS KEELERI LURIDUS (Dodge). Decided size variation is shown by the 5 ♂ and 5 ♀, taken July 27 to August 22, at Plummer. This is a northern limital point.

SCUDDERIA PISTILLATA Brunner. 2 ♂ and 2 ♀ were captured.

SCUDDERIA FURCATA FURCATA Bruner. A northern limit in the longitude of western Minnesota is Laporte, where a female was taken August 1, 1930, by D. Denning.

ORCHELIMUM GLADIATOR Bruner. 3 ♂ were taken June 16 to August 8 at Plummer.

CONOCEPHALUS FASCIATUS FASCIATUS (DeGeer). 4 ♂ and 1 ♀ were secured from June 16 to September 22.

CONOCEPHALUS SALTANS (Scudder). At Plummer a macropterous female was taken August 7 by D. Denning.

CEUTHOPHILUS MACULATUS (Harris). A very small immature male was found alive on the snow at Plummer on November 19 by D. Denning.

GRYLLUS ASSIMILIS Fabricius. 1 ♂, 1 ♀, June 2 and July 1, Pennsylvanicus Variant; 1 ♀, September 4, Neglectus Variant.

NEMOBIUS FASCIATUS FASCIATUS DeGeer. 3 ♂ and 1 ♀ were taken.

OECANTHUS NIGRICORNIS NIGRICORNIS F. Walker. Three females were captured, all large and stout, with pronotum immaculate; two with antennae suffused and Class 6′ marking, one with antennae faintly suffused only at juncture of joints and Class 4 marking (in this feature as is normal in *nigricornis quadripunctatus.*)

TRIDACTYLUS APICIALIS Say. June 1 to October 5, 5 immature individuals; September 3, 1 ♀ (macropterous). All are unusually recessive in coloration. Plummer is a considerable extension northward of the known range of *apicialis.*

TRIDACTYLUS MINUTUS Scudder. June 1, 2 ♂, 1 ♀ (one male macropterous, pair brachypterous) and 1 large juv. ♂. Plummer is also in this case a considerable extension northward of the known range of the species.

Entomological Literature

COMPILED BY LAURA S. MACKEY UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The **figures within brackets** [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of ENTOMOLOGICAL NEWS for 10c. The number of, or annual **volume,** and in some cases the part, heft, &c. the latter **within** ( ) follows; then the pagination follows the **colon** :

All continued papers, with few exceptions, are recorded only at their first installments.

(*) Papers containing new forms or names not so stated in titles, have an * within parentheses thus (*) following the pagination of reference to paper.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomolog, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. Titles of papers containing new forms or new names will be indicated by an asterisk within parentheses at end of reference, (*).

Papers published in the Entomological News are not listed.

GENERAL.—Belkin, J. N.—Additions to the New York State List of Insects. [19] 28: 220-222. **Eidmann, H.**—Beiträge zur kenntnis der fauna von Südlabrador, insbesondere des flussgebietes des Matamek River. [Zoogeogr., Jena] 2: 204-245, ill. **Glendenning, R.**—Notes on the life history of the Entomological Society of British Columbia. [Pro. Ent. Soc. British Columbia] No. 30: 3-7. **Moreiro, C.**—Entomologia agricola Brasileira. [Inst. Biol. Defesa Agric., Rio de Janeiro] Bol. 1: 274 pp., ill. **Navás, L.**—Décadas de insectos nuevos. [Brotéria] 3: 15-24, ill. **Sherborn, C. D.**—Dates of publication of catalogues of Natural History (post 1850) issued by the British Museum. [75] 13: 308-312. **de la Torre-Bueno, J. R.**—Methods and technique for the collector. [19] 29: 25. The amateur. [19] 29: 42. **Weiss & Ziegler**—Mrs. Thomas Say. [6] 41: 547-555, ill.

ANATOMY, PHYSIOLOGY, ETC.—Abbott, C. E.—Anatomical modifications associated with the oviposition of Megarhyssa lunator. [19] 29: 39-41, ill. **Asana, J. J.**—Studies on the chromosomes of Indian Orthoptera. [Current Sci.] 2: 244-245, ill. **Brubaker, R. W.**—The alimentary tract of Penthe pimelia (Dacnidae). [43] 34: 46-56, ill. **Foerster, E.**—Insektenvermehrung. [17] 51: 28-31, cont. **Grandjean, F.**—Observations sur les organes respiratoires des Oribates. [25] 38: 288-291. **Handschin, E.**—Studien an

Lyperosia exigua und ihren parasiten. Die natürlichen Feinde von Lyperosia. [Rev. Suisse Zool.] 41: 1-71, ill. **Hulls, L. G.**—Some observations on Acherontia atropos, with special reference to the loss in weight which occurs during the pupal state. [9] 67: 25-28. **Kerkis, J.**—Hybridization between Drosophila melanogaster and Drosophila simulans and the question of the causes of sterility in interspecific animal hybrids. [Comptes Rendus, Acad. Sci. USSR] 1: 34-39. **Ling, S. W.**—The development of the wings of a caddice-fly Glossosoma americanum. [4] 66: 18-21, ill. **Martin, C. H.**—Notes on the larval feeding habits and the life history of Eumerus tuberculatus. [19] 29: 27-36, ill. **Perrot, J. L.**—La spermatogenese et l'ovogenese du Mallophage Goniodes stylifer [53] 76: 353-378, ill. **Rao, T. R.**—Polymegalous spermatids in a grasshopper. [Current Sci.] 2: 239-241, ill. **Thomas, M.**—Immobilisation simulatrice et prescience anatomique. [33] 73: 259-262. L'instinct et la psychologie des Papillons. [33] 73: 315-332. **Trajna, S.**—Rigenerazione di appendici in larve di Agrion. [Bull. dell'Ist. Zool. R. Univ. Palermo] 2: 52-70, ill. **Zeuner, F.**—Die stammesgeschichte der käfer. Ueber die beziehungen der form der organe zu ihrer funktion. [Palaeontolog. Zeit., Berlin] 15: 280-311, ill.

ARACHNIDA AND MYRIOPODA.—Crosby, C. R.—An interesting two-eyed spider from Brazil (Tetrablemmidae). [19] 29: 19-23, ill. (*). **Gertsch, W. J.**—Notes on American Lycosidae. [40] 693: 25pp. (*). **Mello-Leitão**—Duas novas especies de Tityus do Brasil. [An. Acad. Brasileira Sci.] 5: 201-203, ill.

THE SMALLER ORDERS OF INSECTS.—Adams, J. A.—Biological notes upon the firebrat, Thermobia domestica. [6] 41: 557-562. **Hood, J. D.**—New Thysanoptera from Panama. [6] 41: 407-434. Some further new Thysanoptera from Panama. [95] 47: 57-82. **Neave, F.**—Stoneflies from the Purcell Range, B. C. [4] 66: 1-6. ill. (*). **Walker, E. M.**—The Odonata of the Maritime Provinces [Pro. Nova Scotian Inst. Sci.] 18: 106-128.

ORTHOPTERA.—Engelhardt, G. P.—Behavior notes on the Asiatic mantis Paratenodera sinensis. [19] 29: 23. **Fulton, B. B.**—The tree crickets of Oregon. [Oregon Agric. Coll. Exp. Sta.] Sta. Bull. 223: 20 pp., ill. **Moreiro, C.**—Forficulideos do Brasil. [Inst. Biol. Defesa Agric., Rio de Janeiro] Bol. 7: 32 pp., ill. (*).

HEMIPTERA.—Ball, E. D.—Some new genera and species of western leafhoppers. [19] 28: 223-228. (*). **Barber & Bruner**—A new subfamily of Lygaeidae, including a new genus and two new species of Pamphantus (Lygaeidae). [6] 41: 531-542, ill. (S). **Beamer, R. H.**—Notes on leafhoppers (Cicadellidae). [4] 66: 16-18. (*). **Hottes, F. C.**—Aphid descriptions and notes. [95] 47: 1-8. (*). **Knight, H. H.**—Phytocoris—Twelve new species from the western United States (Miridae). [19] 29: 1-16. **Martin, M.**—Life history and habits of the pigeon louse (Columbicola columbae). [4] 66: 6-16, ill. **de la Torre-Bueno, J. R.**—New records of Heteroptera from Arkansas. [19] 28: 228.

LEPIDOPTERA.—d'Almeida, R. F.—Etude sur le genre Terias. Etude sur le genre Dismorphia (Pieridae). [25] 38: 298-300: 300-304. (*S). **Busck, A.**—Microlepidoptera of Cuba. [70] 13: 151-202, ill. (*). **Duncan, D. K.**—Rediscovery of a lost species. [19] 28: 240. **Engelhardt, G. P.**—Tornados and butterfly migrations in Texas. [19] 29: 16. **Hemming, F.**—Notes on nine genera of butterflies. [9] 67: 37-38. (*). **Hoffmann, C. C.**—La fauna de lepidopteros del distrito del Soconeisco (Chiapas). [Ann. Inst. Biol Mexico] 4: 207-307. **Nicholson, C.**—Moths eaten by bats. [9] 67: 45. **Rummel, C.**—Notes on Actias luna and its variations. [19] 28: 232. Notes on the isolation of forms or races of Lepidoptera. [19] 28: 234. **Tietz, H. M.**—The genotypes of the North American Hadeninae (Noctuidae). [6] 41: 441-456.

DIPTERA.—Benjamin, F. H.—Descriptions of some native trypetid flies with notes on their habits. [U. S. Dept. Agric.] Tech. Bull. 401: 96 pp., ill. (*). **Curran, C. H.**—The North American Lonchopteridae. [40] No. 696: 7 pp., ill. (*) **Galliard, H.**—Un Phlebotome nouveau du Mexique: Phlebotomus yucatanensis. (An. Parasit. Humaine et Comp.] 12: 1-7, ill. **Russell & Santiago**—An earth-lined trap for Anopheline mosquitoes. [10] 36: 1-21, ill.

COLEOPTERA.—Brown, W. J.—New species of Coleoptera. [4] 66: 22-24. **Chapin, E. A.**—An apparently new scarab beetle now established at Charleston, S. C. [95] 47: 33-36. **Cooper, K. W.**—A new species of Belonuchus (Staphylinidae). [6] 41: 545-546. **Davis, A. C.**—Two new species of Pleocoma (Scarabaeidae). [10] 36: 23-25. **Dawson, R. W.**—New species of Serica (Scarabaeidae) VII. [6] 41: 435-440. **Duncan, D. K.**—Random notes of an Arizona field collector. [19] 28: 229-232. (*). **Frost, C. A.**—Trotting the bogs with the wise bullfrogs. [19] 28: 233-

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THE PROBLEMS OF INSECT STUDY. PAUL KNIGHT, Assistant Professor of Entomology, University of Maryland. Copyright 1933. Edwards Brothers, Inc., Lithoprinters and Publishers, Ann Arbor, Michigan. 3 + 118 lithoprinted pages, 10¾ x 8 inches, on one side of the leaves only, many illustrations. For sale only by the Students' Supply Store, University of Maryland, College Park, Md. Price $3.00 plus postage.—The introduction begins as follows: "This is a book on entomology for people who encounter insects in newspaper columns, gar-

dens, clothes presses, or at the seaside; people who would like to learn something about them but do not want to become entomologists in order to do so. It might be called a consumer's entomology rather than an entomologist's guide book, for it is designed to help the person who uses entomological information rather than gives it. . . . The organization of this manuscript has been based on the things that have interested the largest number of students in the writer's entomology classes. Records of these have been kept for the past eight years. Some of these might not be considered entomology, while others often termed highly important have been omitted or slighted."

The insect problem, we are told, is: "First the recognition of the serious competition between mankind and the insects, and second, the development of effective methods of insect control, with one eye always on the Utopia of complete extermination" (p. 6). The author, one of mankind, although he has devoted much space to the second aspect of this problem, may be said to have written in praise of insects also, for he considers their structure to be perfect (pp. 47, 53), their instincts never-failing (p. 52), and to have enabled them to survive, during long periods of time, in competition with other animals presumably less perfect. We would like to see this question discussed by some one not an entomologist and to see whether equal perfection of structure can be shown to exist for some other groups of terrestrial and freshwater animals.

The first, second and sixth chapters, totalling 74 pages, are concerned with the relations between insects and man; the third, fourth and fifth, or 37 pages, deal with the geological distribution, anatomy, physiology, development and classification of insects, the last-named only as far as the orders. There is considerable duplication in the second and sixth chapters, which we think might be profitably compressed or united. There is a list of references at the end of each chapter, and of Entomological Literature in Appendix I near the end of the volume. Appendix II is a list of 50 of the more important insects not native to the United States and III a list of 14 native insects, both of human economic value. As we infer that this lithoprinted edition is the prelude to one in type, we suppose that fact to be the reason for the absence of an index which every book of this nature should have. Personally, and we are not alone in this, we find the width of page in this and similarly produced volumes, to be too great for comfortable reading for any length of time. P. P. CALVERT.

OBITUARY

With great regret we note in *Science* for March 2, 1934, announcement of the deaths of WILLIAM BEUTENMÜLLER on February 24th and of DR. ROBERT H. WOLCOTT on January 23rd. We are indebted chiefly to *American Men of Science* for the following biographical details.

Mr. Beutenmüller was born at Hoboken, New Jersey, March 31, 1864, and educated in public and private schools in New York City. He was curator of the department of entomology in the American Museum of Natural History from 1888 to 1912. He married Edna Hyatt, daughter of the distinguished naturalist, Alpheus Hyatt, and her skilful pencil illustrated many entomological publications of the early part of the present century.

Mr. Beutenmüller edited the first eleven volumes of the *Journal of the New York Entomological Society*, of which organization he was president in 1900. His entomological publications dealt with the Orthoptera (1894) and Lepidoptera (1890-1902) of the vicinity of New York City, insects of the Black Mountains of North Carolina, with various Coleoptera and Lepidoptera, particularly the genus *Catocala* (1902-08) and the Sesiidae (1897-1909), gall insects (1907-1918) and insects injurious to forest trees. In recent years he lived at Tenafly, New Jersey.

DR. ROBERT HENRY WOLCOTT was born at Alton, Illinois, October 11, 1868, and studied at the University of Michigan whence he received the degrees of B.L. (1890), B.S. (1892) and M.D. (1893). In the following year he entered the department of zoology at the University of Nebraska, eventually becoming professor and chairman of the department in 1909. In 1906 he was president of the Nebraska, Academy of Science. His entomological work was concerned with the Lepidoptera of Michigan and of Nebraska and with the Acarina, especially the Hydrachnidae.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Wanted—Names and addresses of those desiring Coleoptera, Lepidoptera and Hymenoptera of Pennsylvania and New Jersey. R. C. Casselberry, 71 E. Price Ave., Lansdowne, Pa.

Exchange—Texas Orthoptera. F. B. Isely, Trinity University, Waxahachie, Texas.

Wanted—Names and addresses of those desiring insects from Colorado. Charles H. Hicks, P. O. Box 262, Boulder, Colorado.

Desire to Exchange—Lepidoptera—pupae—ova. Cocoons, chrysalids especially wanted. Correspondence desired from all parts U. S., Canada, Mexico, Central, South America. Arthur Smith, Los Banos, California.

Geometers Wanted for cash, or in exchange for West Coast Butterflies, Noctuids or other Geometers. Edward Guedet, P. O. Box 305, Napa, Calif.

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